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Preliminary Assessment

Port of Portland
Terminal 5
N. Lombard Street
Portland, Oregon 97203

September 5, 2000

Prepared by: Port of Portland

General Site Data

Site Name and Address:	Port of Portland Terminal 5 N. Lombard Street Portland, Oregon 97203
Current Owner:	Port of Portland P.O. Box 3529 Portland, Oregon 97208 Contact: John Fernie, Terminal Manager Phone: (503) 944-7206
Current Operator:	Columbia Grain, Incorporated 15660 N. Lombard Street Portland, Oregon 97203 Contact: Bert Farrish, Vice President Phone: (503) 286-9681 Alcatel Submarine Networks, Incorporated 15540 N. Lombard Street Portland, Oregon 97203 Contact: Sean Smith, Ops. Phone: (503) 240-4166 Portland Bulk Terminals 15550 N. Lombard Street Portland, Oregon 97203 Contact: Chris Alexander, Terminal Manager Phone: (503) 285-4200 Contact: Kevin Jones, Regional Manager Phone: (503) 285-4200
Legal Description:	Sections 23 and 26, Township 2 North, Range 1 West
Directions to site:	Terminal 5 is located on the east bank of the Willamette River approximately 2 miles upstream from the its confluence with the Columbia River.

1.0 Introduction

This report presents the results of a Preliminary Assessment (PA) for the Port of Portland Terminal 5 site located in Portland, Oregon. The Port of Portland conducted this PA at the request of the Oregon Department of Environmental Quality's (DEQ) Waste Management and Cleanup Division. As part of the Portland Harbor Sediment project the DEQ has either conducted PA's or instructed landowners/potentially responsible parties to conduct PA's to determine the potential level of impact that facilities have on the sediments of the Willamette River.

This PA is being conducted as part of the Portland Harbor Sediment project and subsequent individual site investigations being conducted by DEQ to determine all potential sources of sediment contamination in the Willamette River. The report is designed to provide DEQ with the history of this site based on chemical and waste handling practices and to evaluate potential exposure pathways (surface water, air, groundwater and direct contact) for chemicals that may have been released and potentially impacted Willamette River sediments from facility operations.

2.0 Background

2.1 Site Description

Terminal 5 is a 173 acre site located on the east bank of the Willamette River at RM 2.0. It is located in the Rivergate Industrial District in north Portland. Adjacent properties include Oregon Steel Mills to the south, Columbia Slough and Kelley Point Park to the north, Union Pacific Railroad and North Lombard Street to the east, and the Willamette River to the west.

Terminal 5 consists of three facilities (see Attachment J):

- A mineral bulk facility leased and operated by Portland Bulk Terminals (PBT), a railcar to ship transfer facility that has handled potash and urea
- A grain terminal leased and operated by Columbia Grain, Inc., that has handled wheat, barley, and corn
- Alcatel Submarine Networks, Incorporated a manufacturer of submarine cable

Each facility has a separate storm water system.

Portland Bulk Terminal

The PBT operating area is comprised of 141 acres. Of the 141 acres, about 80 acres drain to a stormwater settling pond located in the west-central portion of the facility. The pond discharges into the primary drainage ditch, which then discharges into a sedimentation manhole and a sampling manhole before discharging to the Willamette River through Outfall RG13PP. The sedimentation manhole provides additional solids removal. Of the 80 acres that drain to the settling pond, about 300,000 square feet are impervious (buildings and roadways). Runoff from a conveyor washing system classified as process water, is collected in effluent tanks and is metered to the city sewer system.

Alcatel Submarine Networks

Stormwater from the Alcatel Submarine Networks facility discharges to the Willamette River through one outfall. The facility is divided into half with the north end of the facility being drained by one drainage system and the southern end of the facility being drained by another. The two drainage systems connect inland from the outfall at a manhole.

Columbia Grain

Two outfalls, RG11PP and RG12PP, drain the Columbia Grain facility. The drainage system drains employee parking lot areas, truck loading areas, and warehouse and shop areas. All areas are paved. Areas that are not included in the storm water drainage system are unpaved.

2.2 Ownership and Operational History

Prior to 1935, the property was undeveloped (see 1935 aerial photograph in Attachment B). Between 1935 and 1967, the property remained undeveloped (see 1956 and 1967 aerial photographs). Between 1970 and 1980, the property was cleared, but not developed (see 1974 aerial photograph). During this time, the shoreline was used for moorage of log rafts. First development of the site occurred in 1975 when the grain terminal was built (see 1981 aerial photograph).

The property was filled with silty sand from the Willamette River over a period of time from 1964 to 1968, bringing it to elevation +25 feet (see 1967 aerial photograph). From 1968 to 1973, successive fills with Columbia River sand raised the site to its present elevation of approximately 34 feet CRD (see 1974 aerial photograph).

In 1977, the southerly portion of the property was sold to Pacific Supply Cooperative. That area was subsequently surcharged with 191,000 CY of material borrowed from the filled land immediately to the north. In 1980, the Port reacquired the property from Pacific Supply Cooperative.

The Port submitted an application for a permit to place fill material in state and federal jurisdictional wetlands on Terminal 5 for development of a bulk commodities marine terminal facility (which exists today). On October 15, 1997 the Port of Portland was issued a material fill permit No. 9836. The Port was then reissued the permit in October 5, 1998 (expired in October 1999). The Port filled 12.5 acres of wetlands considered jurisdictional by the US Army Corps of Engineers. Of this amount, 9.4 acres of wetland were considered jurisdictional by the Oregon Division of State Lands. A five-year monitoring plan was developed by the Port to monitor wetland mitigation at Terminal 5. Mitigation consists of restoring 10.7 acres of wetlands by removing fill material and planting native vegetation. The primary goals of the mitigation program are to diversify wildlife habitat and enhance a wildlife corridor between the Willamette River and the Columbia Slough near Smith-Bybee Lakes.

Attachment B includes additional aerial photographs for Terminal 5.

Grain Terminal

Cook Grain Inc. built the modern Terminal 5 Grain Elevator in 1975(see 1974 aerial photograph). In 1978, Marubeni America entered into an agreement with Cook Grain to operate the facility. Also in 1978, Cook Grain subleased the property and facilities to Columbia Grain. In 1984, Columbia Grain purchased Cook Grain's leasehold interest [22].

The grain facility occupies approximately 42 acres of Terminal 5. It includes Berth 501, a 600-foot long berth. The berth is dredged to –40 feet Columbia River Datum (CRD). A barge-unloading facility located on the inside of the dock is dredged to –15 feet CRD.

The grain facility originally consisted of a 1.5 million bushel storage capacity grain elevator with the capability to receive grain by barge, rail and truck. In 1981, the elevator was expanded to have a capacity of 4.0 million bushels. In addition, a rail-receiving pit was installed, and the configuration of the railroad track was changed. A central vacuum system for the thorough cleaning of the elevator was also installed. Between 1978 and 1989, up to 3 million tons per year of grain were stored and transported from the grain terminal.

Alcatel Submarine Networks

In July 1988, the Port entered into a 30-year agreement with Alcatel Submarine Networks, Inc. to lease approximately 15 acres and 600 lineal feet of waterfront to construct a facility to manufacture fiber optic submarine cable to be loaded onto cable-laying vessels at their dock [22].

Portland Bulk Terminal

In 1982, Pacific Coal Corp. broke ground on a 116 -acre site at Terminal 5 for a $60 million coal terminal designed to export 10 million tons of coal annually to Japan, Korea and Taiwan – countries that had announced they were converting 50 percent of their energy use from oil to coal [22]. It consisted of a rotary car dumper and indexing system, a shiploader and sampling station, a dock, a stacker reclaimer, a conveying system, and an unlined settling pond. As this facility was nearing completion, OPEC unexpectedly cut the price of oil and the bottom dropped out of the Asian plans to convert to coal. With the demand vanished, Pacific Coal Corp. went out of business leaving the coal terminal 80 percent complete. The Port spent the next several years trying to market the coal equipment. The site and the equipment proved to be a valuable asset in attracting Canpotex – the Canadian potash consortium (headquartered in Saskatoon, Saskatchewan) that eventually built the $50 million multi-product mineral bulk export terminal on the same site in 1996. It is now operated by Portland Bulk Terminals, Inc. (Canpotex/ Kinder Morgan Terminal Inc.).

Portland Bulk Terminals is currently exporting approximately 2 million metric tons of potash, primarily to Asia. Potash principally consists of potassium, as such it is used as fertilizer. Potash is also used in paint, artificially sweetened jelly and preserves, raw cuts on meat, and pharmaceuticals. It is also used as a dietary supplement, flavor enhancer, flavoring agent, gelling agent, nutrient, salt substitute, tissue softening agent, and yeast food. Practically all of the potash handled through Terminal 5 is used as fertilizer. In addition to potash, urea has also been handled. Future cargoes may include coal, sulfur, coke and bentonite clay.

The facility transfers potash from railcar to ship for Canpotex. Railcars are delivered and picked up directly by the delivering railroad. Material is transferred from railcars into four hoppers with belt feeders under each hopper, feeding onto a cross-conveyor and then to the inclined conveyor leading to the ship loader tower. A multi-movement loading spout is capable of loading Panamax size vessels. The ship loading system is equipped with dust collection equipment, dust suppression baffles in the hoppers, and a cascade

spout that is equipped with a "hula-skirt" to house a dust collection vacuum. Portland Bulk Terminal has developed BMPs to deal with loading dust suppression. Other environmental features include a cyclone bag house system that collects dry material from operation equipment rather than having a wash-down system.

3.0 Waste Characteristics

Columbia Grain

A 1991 Environmental Assessment (EA) of Terminal 5 found no areas of concern related to Columbia Grain's operations [18]. No sampling was performed as part of the EA.

An underground storage tank, located on property leased to Columbia Grain, was removed during May of 1998. The tank was a 3,000 gallon diesel tank. The DEQ file number is 26-98-0752. No environmental concerns were evident at time of removal [27]. DEQ has declared that no further action is necessary.

Alcatel Submarine Networks

In 1988, the Port performed an EA for the portion of Terminal 5 occupied by STC Submarine Systems [7]. At the time of the EA, the property was being used to store miscellaneous equipment; 55-gallon drums and 5-gallon pails of what appeared to be lubricants, grease or waste oil; two trailers; and a truck trailer. A vacant and uncompleted two-story workshop and office building were present in the southeast portion of the property. Two storage sheds were located near the central portion of the property (see 1987 aerial photograph). Four areas of minor potential concern were identified:

- Five 55-gallon drums and approximately 30 5-gallon pails were observed in the north-central portion of the property, west of the building. Limited, surficial soil staining was observed near the drums and pails. Chrysene (30 mg/kg), benzo(b)fluoranthene (150 mg/kg), benzo(k)fluoranthene (150 mg/kg), benzo(a) pyrene (280 mg/kg), indeno(1,2,3-cd) pyrene + dibenz(a,h)anthracene (230 mg/kg), and benzo(g,h,i)perylene (480 mg/kg) were detected in the sample of stained soil collected in this area.
- Two 5-gallon pails were observed in the north-central portion of the property, east of the area where the drums and other pails (described above) were observed. - Limited, surficial soil staining was observed. No soil samples were collected in this area.
- Six 55-gallon drums and nine 5-gallon pails were observed in the south central portion of the property. Limited, surficial soil staining was observed. Acenaphthalylene (1,700 mg/kg), acenaphthene (760 mg/kg), fluorene (560 mg/kg), phenanthrene (20 mg/kg), fluoranthene (130 mg/kg), pyrene (140 mg/kg), benzo(a)anthracene (13 mg/kg), benzene (0.16 mg/L) and toluene (1.2 mg/L) were detected in the sample of stained soil collected in this area.
- One quarter barrel was observed in the southwest quadrant of the site. No surface staining was observed.

On July 8, 1988, approximately 30 cubic yards of contaminated soil was removed. On July 25, 1988, the DEQ approved the disposal of the contaminated soil at the Killingsworth Landfill. The soil was transported to the site by Hahn and Associates.

The Alcatel Submarine Networks building now covers the locations where the two soil samples were collected and contaminated soil removed (see 1993 aerial photograph).

STC Submarine Systems had reported a spill of hazardous materials during 1990. Alcatel management informed the Port by a phone interview that they had a 1 to 2 gallon spill of TCE. The spill was minor and was located within the facility. The cause of the spill was a jammed production line. The spill was cleaned up with absorbent material and placed in a drum for later disposal with Chemical Processors, Inc [28].

A 1991 EA of Terminal 5 found no areas of concern other than an aboveground storage tank (AST) located south of the STC facility, near the Port's guard station, that had no secondary spill containment [16]. No signs of spilled fuel were observed. No samples were collected as part of this EA.

Portland Bulk Terminal

A 1991 EA of Terminal 5 found that the area now occupied by PBT was open, undeveloped land. Portions of the area appeared to have been used to load and unload cargo, but no areas of environmental concern were identified [16]. No sampling was performed.

In 1993, the Port performed an environmental assessment for the area now occupied by PBT. At the time of the assessment, the bulk loading facility was occupied by the unfinished coal export equipment. The 1993 environmental assessment found no indication of USTs on the property. An empty 675-gallon AST was found to be present near the northern margin of the property. Two small surficial soil stains, suspected to be petroleum based, were observed. One stain was under the AST and the other was at the base of the non-PCB electrical transformer near the stacker/reclaimer. Also located on the property were two equipment trailers used to store motor oils, gasoline, paint, and machinery oil. The environmental assessment also refers to a water well that was constructed on the property in 1982. As of 1993, no reported releases or spills of hazardous substances were contained in agency files. No sampling was performed as a part of this environmental assessment.

In 1995, Hall-Buck Marine performed a Phase I ESA prior to development of the PBT facility [9]. Key observations made as part of the Phase I are as follows:

- No hazardous materials or petroleum-product staining was observed, except for a small area where stained soil and stressed vegetation were observed beneath an electrical transformer mounted on a concrete pad in the southwest portion of the property.
- The 675-gallon diesel AST had been removed from the property; the AST was reportedly used by Riedel to refuel vehicles during construction.
- No releases of hazardous materials or wastes had occurred based on a review of agency and Port files.
- No PCBs had been used or stored at the site based on a review of Port files.

No sampling was performed as part of the ESA. The ESA did, however, refer to groundwater sampling results that were included in a subsequent Phase II ESA.

In 1995, Hall-Buck Marine performed a Phase II ESA prior to development of the PBT facility [10]. The results of the Phase II ESA are as follows:

- Groundwater samples were collected from two monitoring wells (MW-2 and MW-3) installed near a lagoon (referred to as the "Blue Lagoon") used by Oregon Steel Mills as a source of water for cooling slag. Groundwater samples were also collected from three temporary borings. Ranges of detected dissolved metals concentrations were as follows: 0.007 to 0.057 mg/L for arsenic, 0.011 to 0.15 mg/L for barium, 0.002 mg/L for lead, and 0.0069 to 0.045 mg/L for zinc. No petroleum hydrocarbons were detected in any of the three temporary borings. A total organic halide concentration of 0.017 mg/L was detected in one of the temporary borings (SS-2).
- Seven shallow (1.0 to 1.5 feet bgs) soil samples were collected from seven separate locations. Ranges of detected metals concentrations were as follows: 1 to 6 mg/kg arsenic, 49 to 89 mg/kg for barium, 7 to 14 mg/kg copper, 10 to 20 mg/kg for nickel, and 24 to 49 mg/kg for zinc. No petroleum hydrocarbons or total organic halides were detected.

In 1995, vandalism resulted in the loss of 200 to 300 gallons of mineral oil from a 2,200 gallon transformer located in the southwest portion of Terminal 5. A sample of the mineral oil collected from the transformer was analyzed and found to contain non-detectable levels of PCBs. At the time that the vandalism was discovered, a small, older spill located east of the transformer was observed. The transformer was removed one day after the release was discovered. The Port collected soil and groundwater samples during and following cleanup activities. Spill cleanup involved the removal of approximately 25 cubic yards (CY) of soil to a depth of 4 feet below ground surface (bgs) and pumping of 1,200 gallons of water from the excavation. Groundwater was encountered at a depth of 3 feet bgs. Impacted soil in the vicinity of the smaller, older spill was also removed to a depth of 2 feet bgs. Soil samples collected from the bottom of each excavation and from the sidewalls of the larger excavation all contained TPH at concentrations at or below 20 mg/kg. A groundwater sample collected after the removal of water contained 2 mg/L of TPH, 2.2 ug/L of phenanthrene, lower concentrations of other non-carcinogenic PAHs, and no detectable levels of carcinogenic PAHs (at a detection limit of 0.1 ug/L). The excavated soils were transported to Oregon Hydrocarbons for thermal treatment and the groundwater was transported to Harbor Oil for recycling. Attachment E provides a copy of the report discussing the transformer oil spill cleanup [2].

On June 26, 1998, DEQ issued a Notice of Noncompliance (NON) for violations to NPDES Permit No. 101377, File No. 70613, for a total suspended solids (TSS) discharge in excess of permit limits [8]. This permit covers treated stormwater runoff, treated bulk storage runoff, and treated wash water discharged through Outfall No. 001(RG13PP.

Hall-Buck Marine responded to the NON stating that the removal of beaver dams in the pond was the cause of the TSS exceedance [20].

On August 28, 1998, the City of Portland issued a Letter of Violation and Notice of Intent to Assess Civil Penalty to Hall-Buck Marine, Inc. for violations of its Industrial Wastewater Discharge Permit No. 400.12 [5]. The violations were for exceedances of allowable oil & grease discharge limit of 100 mg/L. Kinder Morgan Bulk Terminals, Inc. (formerly Hall-Buck Marine, Inc.) responded to the Letter of Violation on September 9, 1998, stating that the facility immediately returned to compliance. Subsequent sampling of the facility wastewater demonstrated that oil & grease levels were below permit limits. This Letter of Violation followed an August 26, 1998 notice from the City of Portland regarding violation of the total dissolved solids (TDS) discharge limit [4].

Blue Lagoon

The Blue Lagoon was a body of water used by Oregon Steel Mills (OSM) as a source of cooling water. OSM used water from the Blue Lagoon to cool slag; water was returned to the lagoon via a drainage ditch located on OSM property. The Blue Lagoon was approximately 4 acres in size. It was contiguous with the southwestern margin of Terminal 5. The lagoon property was originally owned by the Port. In 1975, OSM purchased the lagoon property. The Port subsequently repurchased the lagoon property in 1981. However, OSM continued to use the lagoon until 1994. As of 1985, the banks and bottom of the Blue Lagoon were covered with a fine, white, powder-like material and the water was crystal clear with a distinctive green tinge. When OSM first started operating the lagoon was twice the size it was in 1985 and it extended further in a southerly direction.

In 1985, 10 to 12 55-gallon drums containing railroad spikes and lube oil were discovered near the lagoon in 1985. The drums were removed from the site by the Port.

In 1989, the Port placed 1,200 CY of sediment in the pond under a permit from the Corps of Engineers (COE). The DEQ verbally approved the discharge of water from the pond into the Willamette River.

In 1994, the Port performed a preliminary site investigation for the Blue Lagoon [1]. The results of the preliminary site investigation are as follows:

- Five lagoon water samples were collected in late 1993. The pH of the lagoon water ranged from 9.2 to 10.2. Total metal concentrations detected in the water samples found that barium and copper were present at concentrations up to 0.0545 and 0.0042 mg/L, respectively.
- Three lagoon sediment samples were collected. Ranges of metals concentrations detected in the sediment samples were as follows: 2.31 to 4.74 mg/kg for arsenic, 706 to 907 mg/kg for barium, 21.3 to 77.4 mg/kg for chromium, 18.5 to 38.4 mg/kg for copper, 17 to 42 mg/kg for lead, 0.04 to 0.06 mg/kg for mercury, 6.2 to 22 mg/kg for nickel, and 39.8 to 167 mg/kg for zinc.

- Two soil samples were collected from each of four soil borings. Ranges of metal concentrations detected in the soil samples are as follows: 3.25 to 3.67 for arsenic, 75.1 to 144 mg/kg for barium, 14.8 to 30.7 mg/kg for chromium, 3.9 to 13 mg/kg for lead, and 0.03 to 0.09 mg/kg for mercury.
- A background soil sample was collected. Metals concentrations detected in the background sample are as follows: 2.1 mg/kg for arsenic, 46.3 mg/kg for barium, 11.1 mg/kg for chromium, 6.97 mg/kg for copper, 2.6 mg/kg for lead, 49 mg/kg for nickel, and 31.3 mg/kg for zinc.
- A slag sample was collected and contained the following detectable levels of metals: 5.0 mg/kg arsenic, 295 mg/kg of barium, 3,950 mg/kg of chromium, 133 mg/kg of copper, 10.8 mg/kg of nickel, 3.5 mg/kg of silver, and 124 mg/kg of zinc.
- Barium and zinc were the only Toxicity Characteristic Leaching Procedure (TCLP) metals detected in either the background soil or slag samples. Barium was detected in the slag sample at a concentration of 1.39 mg/L. Zinc was detected in the background soil and slag samples at concentrations of 0.147 and 0.136 mg/L, respectively.
- Four monitoring wells were installed near the Blue Lagoon. Ranges of dissolved metals concentrations detected in the groundwater samples were as follows: 0.057 to 0.075 mg/L for arsenic, 0.00908 to 0.180 mg/L for barium, 0.0069 to 0.0096 mg/L for zinc.

In 1995, a supplemental investigation was performed for the Blue Lagoon [23]. The following summarizes the results of the supplemental investigation:

- A geophysical survey conducted around the lagoon found that metallic debris (e.g., steel reinforcing bar, pipes, metal strapping, and construction debris) were present near the west end and southern and eastern portions of the lagoon. Metallic debris was not detected in the northern and central portions of the lagoon.
- Seven metals were detected in five background, surface soil samples collected from the north side of the lagoon. The ranges of concentrations for the detected metals were as follows: 46.8 to 63.4 mg/kg for barium, 12.8 to 16.7 mg/kg for chromium, 6.98 to 14.0 mg/kg for copper, 2.6 to 10.6 mg/kg for lead, 0.045 mg/kg for mercury, 8.28 to 12.5 mg/kg for nickel, 27.7 to 52.6 mg/kg for zinc. No organochlorine pesticides, chlorinated herbicides, or petroleum hydrocarbons were detected in any of the five samples; oil & grease was detected in one sample just above its quantification limit.
- Seven slag samples collected from along the eastern and southern lagoon shoreline were combined into three composite samples, each representing a different type of slag. The ranges of total metals concentrations detected in the slag samples were as follows: 2.1 to 12.1 mg/kg for arsenic, 76.4 to 411 mg/kg for barium, 2.4 mg/kg for cadmium, 633 to 5,960 mg/kg for chromium, 117 to 423 mg/kg for copper, 33 to 126 mg/kg for lead, 10.8 to 166 mg/kg for nickel, 71.8 to 516 mg/kg for zinc. No metals were detected in TCLP tests performed on the composite samples. No ogranochlorines pesticides, polychlorinated biphenyls

(PCBs), chlorinated herbicides, TPH, or oil & grease were detected in any of the slag samples, except for one sample that contained 1.3 mg/kg of PCBs.

- Three sediment cores were collected from the lagoon. The ranges of total metals concentrations detected in the lagoon sediment samples were as follows: 2.31 to 8.11 mg/kg for arsenic, 109 to 907 mg/kg for barium, 0.22 to 1.9 mg/kg cadmium, 16.4 to 236 mg/kg for chromium, 15.4 to 112 mg/kg copper, 7.1 to 82.3 mg/kg lead, 0.026 to 0.26 mg/kg mercury, 15.4 to 46.9 mg/kg nickel, and 55.9 to 550 mg/kg zinc. Barium and zinc were the only TCLP metals detected at concentrations up to 3.9 and 1.16 mg/L, respectively. No organochlorine pesticides, chlorinated herbicides, TPH, oil & grease, or volatile organic compounds (VOCs) were detected in the sediment samples. PCBs, as Aroclor 1248, were detected in the 0 to 1-foot depth interval in each core at concentrations ranging from 1.4 to 8.7 mg/kg.
- Sampling of the four groundwater monitoring wells. The ranges of dissolved metals concentrations detected in the groundwater samples were as follows: 0.004 to 0.594 mg/L for barium, 0.107 mg/L for chromium, and 0.0132 to 0.019 mg/L for zinc. Groundwater pH ranged from 6.03 to 12.84; the latter pH measurement was taken from a well screened in slag material. No organochlorine pesticides, chlorinated herbicides, oil & grease, or VOCs were detected.
- The direction of groundwater flow was found to be south toward the lagoon and then westerly toward the Willamette River.
- A surface water sample was collected from the lagoon. Dissolved metals concentrations detected in the sample were as follows; 0.0718 mg/L for barium, 0.016 mg/L for chromium and 0.0039 mg/L for copper. The pH of the water sample was 10.8.

Between October of 1993 and April of 1996, the four wells installed near the Blue Lagoon were sampled three times. Between April of 1996 and October of 1999, three of the four wells were sampled four times. During the last sampling event (October of 1999), groundwater samples were analyzed for total metals (arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc). Filtered samples were analyzed for those metals where total concentrations exceeded EPA Maximum Contaminant Levels (MCLs) or Secondary MCLs. Iron and manganese were the only two metals whose total concentrations were found to exceed their respective Secondary MCLs. Dissolved iron and manganese concentrations were also found to exceed their respective Secondary MCLs. The pH of each groundwater sample was also measured. pH values ranged from 6.4 to 9.0. Attachment C contains the most recent groundwater monitoring report for the Blue Lagoon [14].

In 1995, the Port sampled seven sources containing 200,000 CY of fill material located in the Rivergate Industrial District for use as surcharge for the potash storage building construction and as fill material on the portion of property developed as the PBT facility [3]. The seven sources were sampled and analyzed for total petroleum hydrocarbons, volatile organics, and total metals. No TPH was detected in any of the samples submitted to the laboratory for analysis using Oregon DEQ Method TPH-HCID and no volatile organic compounds were detected based on field screening of sample headspace with a

photoionization detector (PID). No cadmium, selenium or silver were detected in the samples. Maximum metals concentrations were 4.07 mg/kg for arsenic, 92.3 mg/kg for barium, 17.1 mg/kg for chromium, 6.9 mg/kg for lead, and 0.036 mg/kg for mercury. Attachment D contains the report for these results.

Also, in 1995, the Port removed 503.53 tons of apparent sandblast grit material that was placed near the Blue Lagoon. The grit may have originated from sandblasting activities conducted at Terminal 6. The apparent sandblast grit was sampled and analyzed for Toxicity Characteristic Leaching Procedure (TCLP) metals to determine if the material would classify as a hazardous waste. None of the samples were found to contain TCLP metals above regulatory thresholds. The apparent sandblast grit materials were excavated and transported to the Hillsboro Landfill for disposal under Oregon Special Waste permit number 2396. The remainder of the apparent sandblast grit material was left at the site because these materials were within the boundaries of a jurisdictional wetland. Attachment I contains a report documenting the removal of the materials [13].

In 1996, after receiving the wetland fill permit, the Port removed an additional 20.52 tons of sandblast grit and 145.43 tons of debris consisting of asphalt, railroad ties, wood and vegetation. The materials were transported to Hillsboro Landfill for disposal under Oregon Special Waste permit number 2396 [11].

In May of 1996, the Port began filling the Blue Lagoon with sand from a pile of fill material placed on the property as surcharge (same material characterized in 1995 – see discussion above). Water displaced by filling was pumped through a pH adjustment system to a settling pond before being discharged to the Willamette River under NPDES Waste Discharge Permit No. 70613. Discharge monitoring performed by the Port in accordance with the Permit found that turbidity levels were above discharge limits. The Port made several attempts to reduce turbidity levels. The Port ultimately requested and obtained DEQ's approval to pump water from the Blue Lagoon onto the sand pile to pre-wet it prior to placement in the Lagoon.

In 1998, the Port performed a Phase I ESA of the South WYE Track located along the southwest corner of the property; the western and central portions of the South WYE Track traverse the former Blue Lagoon area [12]. The South WYE Track area was to be used by UPRR under terms of an easement. Previous assessments of the lagoon identified the presence of steel slag along the eastern and southern lagoon shoreline and in soil boring MW-1 located directly adjacent to the South WYE Track.

4.0 Groundwater Pathway

4.1 Hydrogeologic Setting

Terminal 5 is located in the Portland Basin, a northwest-southeast trending basin that is approximately 20 miles wide by 45 miles long. This structural basin is filled with consolidated and unconsolidated continental sedimentary rocks. Older rocks that underlie the basin-fill sediments include the Skamania Volcanics; Columbia River Basalt Group; basalts of the Waverly Heights, Goble Volcanics, Pittsburg Bluff, Scappoose, and the Rhododendron Formations. The Sandy River Mudstone and the Troutdale Formation are the oldest of the basin filling-sediments. Large quantities of Pleistocene sediments were deposited during catastrophic floods of the Columbia River. These floods occurred as a result of the periodic failures of ice dams impounding huge lakes in Idaho and Montana. The catastrophic flood deposits can be grouped into two easily discernable lithologic units: a basaltic sand and gravel unit with varied amounts of cobbles and boulders and a finer, stratified, micaceous arkosic sand, silt and clay. The former unit is present near the Columbia River channel in southern Clark County and north Portland. The later unit exists at an altitude of about 250 feet throughout the Portland Basin. Alluvium deposits from the Columbia were deposited on the Pleistocene sediments. The alluvium deposits consist of sand and silt.

Eight major hydrogeologic units form the Portland Basin aquifer system. Proceeding from oldest to youngest, these units include:

- Older rocks
- Sand and Gravel Aquifer (SGA)
- Confining Unit 2 (CU2)
- Troutdale Sandstone Aquifer (TSA)
- Confining Unit I (CU 1)
- Unconsolidated sedimentary rock aquifer
- Consolidated gravel aquifer
- Undifferentiated fine-grained sediments

Of these, the undifferentiated fine-grained sediments, the consolidated gravel aquifer, and the older rocks are the three hydrogeologic units that are relevant to Terminal 5.

The unconsolidated sedimentary aquifer is the uppermost hydrogeologic unit in the Basin. It consists of catastrophic flood deposits, alluvial deposits along smaller streams in the Basin, flood plain deposits along the Willamette and Columbia Rivers, and glacial outwash in basins in northern Clark County. Aquifer yields in the unconsolidated sedimentary aquifer are variable.

The consolidated gravel aquifer is composed of several geologic formations that consist of cemented conglomerate and sandy conglomerate, as well as local accumulations of lavas and surface soils. The conglomerate portion of the aquifer, referred to as the Troutdale Gravel Aquifer (TGA), extends throughout the Basin. The top of the

consolidated gravel aquifer typically ranges from plus 100 to 200 feet. Near the Willamette and Columbia Rivers, the top of the aquifer is eroded to a depth of approximately minus 200 feet. The TGA is a source of public, industrial, and domestic supply. Most wells in the TGA yield a minimum of 50 gallons per minute (gpm) and can yield up to 1,000 gpm.

The Sandy River Mudstone, which also underlies the Troutdale Formation, is composed of mudstone and claystone, with scattered lenses of sandstone and conglomerate. The Columbia River Basalt underlies the Sandy River Mudstone. It is a thick series (700 to 800 feet thick) of layered lava flows, with interbeds of tuff or sedimentary materials [10].

The Columbia River Basalt Group and the Rhododendron Formation are the only older rocks in the Portland Basin that have productive aquifers. In the western and southern boundaries of the Portland Basin, the Columbia River Basalt Group is used as an aquifer. Wells completed in the Columbia River Basalt Group are capable of producing over 1,000 gpm. The Rhododendron Formation underlies the extreme southeastern part of the Portland Basin. It is mainly used for domestic and small-scale irrigation. Wells screened in this formation produce 5 to 25 gpm.

Surface soils at Terminal 5 are made up of hydraulically placed sands and silty sands underlain by recent alluvium of the Columbia River floodplain. Borings installed in the area where the coal export facility was constructed, indicated that the sand fill was approximately 7 feet thick placed over 40 feet of soft medium stiff clay silt with sand layers, 70 feet of dense fine sand and sandy silt, and over 40 feet of medium dense to dense fine sand and silty sand. The alluvium was predominantly medium-sized sand and silt and was generally less than 50 feet in thickness. Immediately underlying this alluvium were Pleistocene silts, sands, and gravels which were laid down during floods associated with the end of the last ice age. These deposits range in thickness from 100 to 200 feet.

In 1982, Riedel contracted for the construction of a domestic water supply well as part of the coal transfer facility development. A 6-inch diameter well was drilled to a depth of 80 feet; the exact location of the well is unknown. Groundwater was first encountered at a depth of 12 feet bgs. Soils encountered during drilling included silts and clays [10].

Based on groundwater monitoring performed near the former Blue Lagoon, shallow groundwater at Terminal 5 flows to the west toward the Willamette River.

4.2 Groundwater Targets

According to a query of the Oregon Department of Water Resources GRID database, there is one onsite water supply well. This well was installed in 1982 to serve as a water supply during construction of the coal export terminal. The well was constructed to a depth of 80 feet and had a reported yield of 150 gallons per minute. The current status of this well is unknown. It is not being used as a source of water supply at Terminal 5. Groundwater is not used as a drinking source. City water is available to the area.

There are another 12 offsite water supply wells located within Sections 23 and 26. Four of the wells are designated as domestic use, two are designated as industrial use, and the remainders have no designated use. Completion depths for the offsite water supply wells range from 190 to 350 feet. The offsite wells are located to the southeast and southwest of Terminal 5.

A broader search of wells in Sections 23, 24, 25, 26, 27, 34, 35 and 36 of Township 2 North, Range 1 West identified 49 water supplies. Of these, 16 were designated as domestic use, 3 were designated as irrigation use, 13 were designated as industrial use, and 17 had no designated use.

4.3 Groundwater Conclusions

Available information for Terminal 5 indicates that there are no onsite uses of groundwater at Terminal 5 and no uses of groundwater downgradient of Terminal 5. The only water supply on the Terminal 5 property is the well installed by Reidel in 1982. This well is not being used as a source of water by tenants at Terminal 5.

Recent groundwater monitoring results for the former Blue Lagoon indicate that iron and manganese concentrations exceed the secondary MCLs for these metals. These exceedances occurred in shallow groundwater, which according to past investigations flows from the former Blue Lagoon in a westerly direction toward the Willamette River. Further, historic sampling of groundwater found no detectable levels of organochlorine pesticides, chlorinated herbicides, or VOCs. Given the location and depth of known offsite water supply wells, it is unlikely that shallow groundwater containing iron and manganese in the vicinity of the former Blue Lagoon would pose a threat to offsite water supply wells.

Past environmental site assessments and site investigation have not identified other locations where groundwater is expected to be impacted by past or current activities at Terminal 5.

5.0 Surface Water Pathway

5.1 Hydrologic Setting

The west side of Terminal 5 borders the Willamette River and the north side borders the Columbia Slough. The only other surface water bodies on or immediately adjacent to Terminal 5 is the stormwater settling pond at the PBT facility.

Based on streamflow measurements made by the United States Geological Survey (USGS) at their Portland gauging station, located at river mile 12 approximately 3 miles upstream of Terminal 1 the average annual discharge for the Willamette River is 33,000 cubic feet per second. Streamflow exceeds 100,000 cubic feet per second approximately 5 percent of the time.

River elevations in the Portland Harbor fluctuate on a daily basis in response to tidal fluctuations in the Columbia River. These tidal fluctuations result in a reversal of water movement in the lower portion of the Portland Harbor. During times of medium to low flow in the Willamette River, tidal effects extend upstream of Terminal 5.

The land surface at Terminal 5 is partially paved with asphalt or concrete or covered with buildings. The remainder of the property is unpaved. Storm water is diverted to and captured by three separate systems.

The site is generally flat at an average elevation of about 34 feet CRD. The Willamette River borders the site to the east. The river water elevation is typically less than 10 feet above MSL and is subject to a mean tidal range of about 2 feet.

Since 1980, maintenance dredging has occurred at Terminal 5 on eight occasions. Table 1 summarizes that berth that was dredged, the year it was dredged, volume of dredged material, and disposal site.

Table 1. Terminal 5 Maintenance Dredging Projects

Berth	Year Dredged	Volume Dredged (cubic yards)	Disposal Site
501	1980	1,200	Swan Island Lagoon
503	1982	30,000	Swan Island Lagoon
501	1987	2,000	Morgan Bar
501	1988	1,600	Morgan Bar
502	1989	20,000 5,400	Morgan Bar Ross Island
501	1992	1,250	Upland Terminal 5
503	1995	4,900	Ross Island Lagoon
501	1996	1,250	Morgan Bar

When the 1995 Blue Lagoon site characterization study was performed, an inundated area was present to the west of the Blue Lagoon. This inundated area extended to the west for several hundred feet and terminated in a small ditch that flowed to the west for another several hundred feet where it discharged into a second inundated area. The presence of water in the ditch appeared to be seasonal. The second inundated area was located near the Willamette River, but was separated from the river by a berm. No surface water connection between the Willamette River and the second inundated area was observed. Also, a ditch extended from the lagoon northward to a gravel road. The ditch may have collected seasonal surface runoff from Terminal 5 [23].

In November 1998, Kinder Morgan of Portland Bulk Terminal observed water seeping into a drainage ditch adjacent to two rail beds located near the former Blue Lagoon. The ditch empties into the settling pond at Portland Bulk that discharges through Outfall RG13PP.

In January 1999, Hahn and Associates sampled the water in the ditch at 3 different locations: upstream, at the water seep, and downstream. The upstream sample had a pH of 6.76. The seep sample had a pH of 11.97.The downstream sample had a pH 11.54. The temperature of the water sampled was highest in the seep sample at 11.92 degrees Celsius. The upstream sample had a temperature of 7.60 degrees Celsius and the downstream sample had a temperature of 10.80 degrees Celsius. Arsenic, cadmium, and mercury were not detected in any of the samples, at a detection limit of 0.001 mg/L. Iron concentrations were 1.79 mg/L in the upstream sample, 3.54 mg/L in the seep sample, and 1.9 mg/L in the downstream sample. Lead was detected at the seep sampling location at a concentration of 0.0332 mg/L. Zinc was detected at the upstream sampling location at a concentration of 0.155 mg/L. There appeared to be a general trend towards higher concentrations of total metals at the seep sampling location with decreasing concentrations at the downstream sampling location .The lowest metal concentrations were detected at the upstream sampling site [29].

In June 1999, EMCON performed additional sampling of the ditch at three locations: upstream, midstream, and downstream. The pH of those water samples was 7.27, 8.45, and 9.58, respectively. The temperature of the water samples was 16.6, 16.5, and 15.9 degrees Celsius, respectively. The chloride concentrations were 791 mg/L, 257 mg/L, and 126 mg/L, respectively, for upstream, midstream, and down stream water samples. Potassium concentrations were 580 mg/L, 150 mg/L, and 66 mg/L, respectively. Calcium concentrations for the three water samples were 146 mg/L, 39 mg/L, and 19.4 mg/L, respectively. [30].

5.2 Surface Water Targets

The lower Willamette River is currently not used as a source of drinking water. However, both recreational and subsistence fishing occur within the lower Willamette River. Commercial fishing is limited to a small Pacific lamprey fishery. Recreational boating, water skiing, swimming, and beach use occur within the Harbor.

According to the Portland Harbor Sediment Management Plan [26], potential environmental receptors for the Willamette River include the benthic community, fish, birds, and mammals.

There is currently a lack of information on the nature and extent of benthic communities in and near the Portland Harbor [26].

The lower Willamette River provides habitat for 39 fish species, including populations of wild cutthroat trout, rainbow trout, and mountain whitefish. White sturgeon are plentiful within the Harbor. The Harbor is also an important migratory corridor, nursery habitat, and adult foraging area for two runs of Chinook salmon, two runs of steelhead trout, and individual runs of Coho and sockeye salmon.

Species that have been selected by regulatory agencies for special protection and/or consideration were identified by contacting the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and the Oregon Natural Heritage Program (ONHP). The following species are Federally listed as threatened pursuant to the Endangered Species Act:

- Steelhead trout *(Oncorhyncus mykiss),* Lower Columbia River Evolutionary Significant Unit (ESU); and
- Chinook Salmon *(Onchohyncus Tshawytscha),* Lower Columbia River ESU.

In addition, coastal cutthroat trout *(Oncorhynuc clarki clarki)* are proposed as threatened for the Southwest Washington/Columbia River ESU.

Great Blue Herons, cormorants, osprey, mergansers, kingfishers, peregrine falcons, and bald eagles routinely forage within the Harbor. The area is also part of the wintering range for the Aleutian Canada goose. All are protected under the Migratory Bird Treaty Act. The peregrine falcon is federally listed as an endangered species, while the Aleutian Canada goose is federally listed as threatened species. The bald eagle also is a threatened species, but was recently proposed to be removed from this list.

The lower Willamette River is water quality limited for the following toxic compounds:

- Dioxins/furans (water column and sediments)
- Mercury (fish tissue)
- Pesticides (water column and sediments)
- Polynuclear Aromatic Hydrocarbons - PAHs (water column and sediments)
- Trace metals (water column and sediments)

The nearest significant wetland is located along the west bank of the Willamette River, near the mouth of Multnomah Channel, about seven miles downstream from Terminal 1.

5.3 Surface Water Conclusions

The available site information indicates that there is a low potential for historic or current upland activities and operations at Terminal 5 to impact surface water and sediments. As will be discussed below, the only two constituents have been detected in sediments above their respective Lower Columbia River Management Area (LCR) Screening Levels [6] at Terminal 5 are DDT and tributyl tin (TBT). Based on the environmental site assessments and site investigations performed at Terminal 5, there are no known upland sources for these two constituents. There also no known over-water sources for DDT given the types of cargo and materials that have historically been handled at Terminal 5. One possible source of TBT is ship-related operations.

There is also a low potential for upland activities to have resulted in releases to the Willamette River via stormwater discharges. Based on the ESAs performed by the Port and others for tenants at Terminal 5, most of the environmental concerns at Terminal 5 were associated with limited petroleum product staining of soils, temporary staging of sandblast grit, and the Blue Lagoon. Most areas of petroleum product staining were addressed prior to site development and the Port removed the sandblast grit materials. Finally, as was discussed earlier, no surface water connection was observed between the Blue Lagoon and the Willamette River.

Finally, there is a low potential for releases to surface water or sediments via subsurface migration of hazardous substances. Groundwater monitoring near the Blue Lagoon indicates that iron and manganese are the only metals present above their respective secondary MCLs. No ogranochlorine pesticides, chlorinated herbicides, oil & grease, or VOCs were detected in groundwater near the Blue Lagoon. Groundwater samples collected elsewhere at Terminal 5 have not indicated impacts from upland activities.

The following summarizes sediment sampling that has been performed at Terminal 5 since 1995.

In 1995, three sediment samples were collected from beneath the dock along the west side of the PBT site as part of Phase II ESA performed by Hall-Buck Marine [10]. The samples were collected at a depth of 1 to 1.5-feet bgs. The ranges of metal concentrations detected in the sediment samples are as follows: 4 to 5 mg/kg for arsenic, 24 to 25 mg/kg for chromium, 33 to 38 mg/kg for copper, non-detectable to 22 mg/kg for lead, 17 to 23 mg/kg for nickel, 134 to 144 mg/kg for zinc. Petroleum hydrocarbons (quantified as motor oil) were detected at concentrations ranging from 166 to 480 mg/kg. No benzene, toluene, ethylbenzene or xylenes (BTEX) or total organic halides were detected. None of the metals concentrations detected in the three 1995 sediment samples exceed the LCRMA Screening Levels [6].

In 1997, the Port performed a sediment characterization study at Terminals 1, 2 and 5 to determine appropriate dredged material options for sediments at these terminals [17]. Sediment samples were collected from two locations at Berth 501: HC-SS-9 and HC-GC-10. The coarse and compact nature of the sediments at sample location HC-SS-9 prevented the collection of a core sample. Thus, a surface grab sample was obtained from this location. A 2-foot core sample was collected at the second location (HC-GC-

10). The samples collected at each location were analyzed for metals, butyltins, pesticides, PCBs, PAHs and phenols. The only constituent that was detected above the LCRMA screening levels was TBT at a concentration of 190 ug/kg in the surface sample collected at location HC-SS-9. Attachment F contains a report documenting the results of the study.

In 1999, two sediment cores were collected at Berth 501, Columbia Grain [18]. At sample location B501-01, the sample was collected to a depth of 6 feet. At sample location B501-02, the sample was collected to a depth of 5 feet. The two samples were composited into two depth integrated samples (0 to 3 feet and 3 to 5 feet) consistent with procedures in the LCRMA. The 0 to 3 foot depth integrated sample was referred to as DMMU1/Berth 501. The deeper sample was referred to DMMU2/B501. No metals, semivolatile organic compounds, PCBs, or butyltins were detected above the LCRMA Screening Levels in samples DMMU1/B501 or DMMU2/B501. The only chemical detected above its screening levels in DMMU1 was DDT at a concentration of 14.9 ug/kg in sample DMMU1/B501 (see Attachment G).

In 2000, subsurface sediment samples were collected at five locations, three at Berth 501 and two at Berth 503 [19]. Two of the sediment cores (HC-VC-B501-01 and HC-VC-B501-02) were collected for the B501-Face dredge management unit. These two core samples were 3 and 5 feet in length and were composited into a single sample for laboratory analysis (HC-B501-C1). One sediment core (HC-VC-B501-03) was collected for the B501-Barge dredge management unit. This core sample was 6 feet in length. It was used to obtain a single sample for laboratory analysis (HC-Barge-C1). The final two sediment cores (HC-VC-B503-01 and HC-VC-B503-02) were collected for the B503 dredge management unit. These two core samples were 2 and 5 feet in length and were composited into a single sample (HC-B503-C1). All three samples were analyzed for metals, PAHs, butyltins, pesticides, selected semi-volatile and volatile compounds, phenols and phthalates. Only one constituent was detected at a concentration above the LCRMA screening levels – TBT was detected at a concentration of 3.5 ug/L in porewater in sample HC-B501-C1 (see Attachment H).

6.0 Air Pathway

6.1 Physical Conditions

The area has a temperate marine climate characterized by wet winters and dry summers. Temperature, and wind data for the area are summarized below.

Temperature [22, 25, 26]

Average Annual	54°F
Coldest Month	January (Average 40°F)
Warmest Month	August (Average 69°F)
Lowest Recorded	-2°F (January 1888)
Highest Recorded	107°F (July 1942)

Wind [22]

Minimum Monthly Mean (October): 6 mph
Maximum Monthly Mean (Dec./Jan.): 10 mph
Maximum Recorded: 88 mph (1962)
Direction: Generally from west, but east winds are common

In the vicinity of Terminal 5, the uppermost unit is fill material, typically sand or silty sand. Portions of Terminal 5 are paved or covered with buildings. The remainder of the property is unpaved.

6.2 Air Pathway Targets

Terminal 5 is located in the Portland Harbor area of the Willamette River and lies within land zoned for industrial use. The areas surrounding Terminal 5 are occupied by marine, industrial, and commercial operations. A residential zone is located greater than 3 miles south of the site. Across the Willamette River to the northwest is rural residential and agricultural land use on Sauvie Island.

6.3 Air Pathway Conclusions

The Port was issued an Air Contaminant Discharge Permit (ACDP) #26-3071 for the coal export facility. The facility was not operational during 1988-1994 so there was nothing to report to the Department of Environmental Quality.

PBT currently handles potash and urea. The air quality permit number and type is 26-3071 ACDP. The permit covers the facilities cargo handling operations from the bottom dump building to ship loading. Dust suppression is used by PBT so conditions do not exceed opacity and fugitive dust standards set by the State of Oregon and the Department of Environmental Quality. There is no information indicating that a release to air has occurred nor is one likely to occur from the operations.

Environmental site assessments have identified areas at the site with limited staining of surface soils and other areas where sandblast grit and drums of lube oil were staged. The Port has performed cleanup activities in most of these areas, including soils impacted by petroleum products and areas where the sandblast grit and drums were staged.

Site investigations performed in the area of the Blue Lagoon found soils and slag containing metals concentrations above background levels. Since the time these investigations were performed, the Blue Lagoon has been filled with material that was tested by the Port before it was brought onto Terminal 5 and placed in the former lagoon. The metals concentrations of the fill material were typical of background levels. Thus, there is a limited potential for airborne releases from the former Blue Lagoon area.

7.0 Direct Contact Pathway

7.1 Physical Conditions

Terminal 5 is located along the east bank of the Willamette River. The entire facility is fenced, limiting entry by the general public.

Portions of the property are paved or covered by buildings thus limiting the potential for direct contact. The remainder of the property is unpaved.

7.2 Direct Contact Targets

Terminal 5 is located in the Rivergate Industrial District. The areas surrounding Terminal 5 are occupied by marine, industrial, and commercial operations. A residential zone is located greater than 3 miles south of the site.

7.3 Direct Contact Conclusions

Current information indicates that soils stained with petroleum hydrocarbons and sandblast grit are no longer present at Terminal 5. The Blue Lagoon has been filled and its bottom covered with materials that were tested by the Port before being placed onsite. Thus, there is a low potential for direct contact with surface by site tenants or site visitors. Direct contact for the general public is prevented by restricted access.

Direct contact with surface soil by terrestrial receptors is unlikely because the lack of attractive habitat in this industrial area.

8.0 Summary and Conclusions

The available soil sampling results for Terminal 5 and past activities and operations conducted at Terminal 5 indicate that there is a low potential for shallow groundwater to be impacted. Even in the former Blue Lagoon area, recent groundwater monitoring indicates that iron and manganese are the only constituents that are present above their respective Secondary MCLs. Given that there is no use of groundwater onsite and nearby water supply wells are screened at depths greater than 190 feet, it is unlikely that the iron and manganese present in groundwater would pose a threat to offsite water supply wells.

Sediment samples have been obtained from Terminal 5 since 1995. With the exception of DDT and TBT, no constituents have been detected at concentrations above LCRMA Screening Levels. There are no known upland sources of DDT or TBT at the site.

Direct and air pathway contact at this site is very unlikely due to the fact that most surface soils stained with petroleum products have been removed. In addition, sandblast grit temporarily stored at the site has been removed. Finally, the former Blue Lagoon was filled with material that was tested before it was placed onsite.

Based on the PA results, no further investigation of Terminal 5 is recommended.

References

1. Century West Engineering Corporation, 1994. *Preliminary Site Investigation, Blue Lagoon, Terminal 5,* prepared for the Port of Portland, Portland, Oregon, February 4, 1994.

2. Century West Engineering Corporation, 1995. *Terminal 5 Transformer Spill Cleanup, Terminal 5 – N. Lombard Street, Portland, Oregon*, August 30, 1995.

3. Century West Engineers, 1995. Letter report regarding Sampling and Analysis of Fill Soil for Terminal 5, Rivergate Industrial District, Portland, Oregon, December 1, 1995.

4. City of Portland, 1998. Compliance Telephone Memorandum regarding Permit Specific Discharge Limit for TDS from Mr. McMillan dated August 26, 1998.

5. City of Portland, 1998. Letter regarding Letter of Violation and Notice of Intent to Assess Civil Penalty LOV-1998-026, from Mr. Dean to Mr. McMillan dated August 28, 1998.

6. Corps of Engineers, 1998. *Dredged Material Evaluation Framework, Lower Columbia River Management Area,* April 1998.

7. Dames & Moore, 1988. *Draft Final Report, Port of Portland, Property Transfer Environmental Assessment, Terminal 5 Cable Site, Portland, Oregon,* prepared for the Port of Portland, Portland, Oregon, June 29, 1988.

8. DEQ, 1998. Letter regarding WQ-Multnomah Co., Hall Buck Marine, Inc., Terminal 5, Permit No. 101377, File No. 70613, EPA No. OR003105-4, Notice of Noncompliance No. WQ-NWR-98-052, from Mr. Baumgartner to Ms. Krein-Schmidt dated June 26, 1998.

9. EMCON, 1995. *Phase 1, Environmental Site Assessment, Port of Portland, Terminal 5 Facility, Portland, Oregon,* prepared for Hall-Buck Marine, Inc., May 22, 1995.

10. EMCON, 1995. Phase 2, *Environmental Site Assessment, Port of Portland Terminal 5 Facility, Portland, Oregon,* prepared for Hall-Buck Marine, Inc., July 12, 1995.

11. GeoEngineers, 1996. Letter report entitled Excavation Activities, Terminal Five, "Blue Lagoon," Port of Portland, Portland, Oregon, July 15, 1996.

12. GeoEngineers, 1998. *Phase I Environmental Site Assessment, Terminal 5 – South WYE Track, Rivergate Industrial District, Portland, Oregon*, January 6, 1998.

13. Hahn and Associates, 1995. *Solid and Hazardous Waste Determination and Disposal Assistance, Sandblasting Grit Material, Port of Portland Marine Terminal 5, North Lombard, Portland, Oregon,* October 11, 1995.

14. Hahn and Associates, 1999. *Groundwater Monitoring Report, Port of Portland, "Blue Lagoon" Site, Terminal 5, Portland, Oregon,* December 22, 1999.

15. Hall-Buck Marine, Inc., 1998. Letter regarding HBM Portland Bulk Terminal 5, Exceedance Notice, Permit No. 101377; Outfall 001 from Ms. Krien-Schmidt to Mr. Sheetz dated June 10, 1998.

16. Hart Crowser, 1991. *Environmental Assessment Report, Marine Terminal 5, Portland, Oregon*, prepared for the Port of Portland, Portland, Oregon, August 12, 1991.

17. Hart Crowser, 1997. *Sediment Characterization Study, River Terminals 1, 2 and 5, Willamette River*, prepared for the Port of Portland, Portland, Oregon, January 14, 1997.

18. Hart Crowser, 1999. *Volume I, Sediment Characterization Study of Local Sponsor's Berths; Columbia and Willamette River Navigation Channel Deepening; Longview and Kalama, Washington and Portland, Oregon,* prepared for the Port of Portland, Portland, Oregon, February 1, 1999.

19. Hart Crowser, 2000. *Sediment Characterization Study, Terminal 5, Berths 501 & 503, Port of Portland,* prepared for the Port of Portland, Portland, Oregon, March 9, 2000.

20. Kinder Morgan Bulk Terminals, Inc., 1998. Letter regarding Letter of Violation & Notice of Intent to Assess Civil Penalty LOV-1998-026; Discharge Permit No. 400-132, Kinder Morgan Bulk Terminals, Inc. (KMBT) – (formerly Hall-Buck Marine, Inc.), Portland Bulk Terminal 5, from Ms. Krien-Schmidt to Mr. Dean dated September 9, 1998.

21. Oregon State University, 1996. *The Climate of Oregon, Climate Zone 2, Willamette Valley,* Agricultural Experiment Station, Special Report 914, Reprinted January 1996.

22. Port of Portland, 1993. *Marine Terminals Master Plan, Appendix A: Facility Inventory*

23. PTI Environmental Services, 1995. *Site Characterization for the "Blue Lagoon" at Marine Terminal 5,* prepared for the Port of Portland, Portland, Oregon, April 1995.

24. U.S. Geological Survey (USGS), 1965. *Ground Water in the East Portland Area, Oregon,* Water-supply Paper 1793.

25. Western Regional Climate Center, 1998. *On-Line Database,* www.wrcc.dri.edu

26. DEQ. 1999. *Portland Harbor Sediment Management Plan*, prepared by the Oregon Department of Environmental Quality, Portland, Oregon, June 1999.

27. Phone interview with Tony Selgato of Columbia Grain, July 10, 2000.

28. Phone interview with Derek Lang of Alcatel, July 13. 2000.

29. Hahn and Associates, 1999. Sampling Analysis Results.

30. EMCON, 1999. Water Quality Evaluation Status and Analytical Results.